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HOME USES FOR MUSCADINE GRAPES

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AT PRESENT, when food conservation and food economy are being so much emphasized, the home utilization of Muscadine grapes is particularly appropriate. In the southeastern United States no fruit is more generally grown. The Muscadine grape arbor affords an abundant supply of this delicious fruit, often the only fruit obtainable in sufficient quantity to warrant preservation. Moreover, these grapes can be prepared in many attractive and appetizing ways without the use of large quantities of sugar, so that these products are within the means of all families.

In the past, instead of being utilized the surplus fruit has been allowed to go to waste, chiefly because of a general lack of knowledge of ways to use it and because the high quality and cheapness of the products have not been realized.

In the following pages, directions for preparing a large number of Muscadine grape products are given. These directions are based upon experience derived from careful experiment and cover the general available knowledge of the subject. By carefully following them one may be certain of obtaining satisfactory results. It is not asserted that these recipes can in no case be improved upon or that they represent the only desirable Muscadine grape products. It is recommended that the housekeeper who can obtain these grapes use this publication merely as a suggestive guide and exercise her ingenuity to devise additional useful methods of preparation.

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CONTENTS.

Page.	Page.
Importance of a better utilization of Muscadine grapes.....	Muscadine grape products—Continued.....
3	Catsup
4	Conserve.....
5	Preserves.....
5	Jam.....
6	Marmalade.....
9	Mincemeat.....
17	Flavoring sirup.....
18	Summary

IMPORTANCE OF A BETTER UTILIZATION OF MUSCADINE GRAPES.

A LARGE surplus of Muscadine grapes¹ which could be profitably utilized at home in culinary ways is allowed to go to waste each year. While in recent years the production of these grapes has assumed real commercial importance, their utilization has been confined almost entirely to consumption in the fresh state and to wine making. The utilization of the fresh fruit has been limited by the poor shipping qualities of the best table varieties and the lack of adequate transportation facilities. The result of this condition is a surplus supply of fruit at home. The small vineyardist sells what fruit he can locally, and the family of the farmer having an arbor of one or two vines use such fresh fruit as they care to eat. The remainder, with few exceptions, is allowed to fall to the ground and decay, though it could be utilized profitably in culinary ways. These uses of Muscadine grapes, however, are little known, and their value for such purposes is unappreciated.

The recommendations made in this bulletin are based largely on culinary investigations conducted at the branch experiment station of the North Carolina Department of Agriculture at Willard, N. C., in a typical farm kitchen simultaneously with other kitchen work. As a wood-burning kitchen range and ordinary kitchen utensils were used, the results are such as might be expected under home conditions.

¹ For general information regarding these grapes, see Farmers' Bulletin 709, entitled "Muscadine Grapes," which will be sent without cost on application to the United States Department of Agriculture.

Methods of preparing sirups, jellies, unfermented juices, catsups, canned grapes, spiced grapes, conserves, preserves, marmalades, jams, and other products were tested, as well as the shipping qualities of the goods.

REQUIREMENTS FOR SUCCESSFUL WORK.

By careful work, desirable food products for the home can be made economically on the farm from surplus Muscadine grapes.

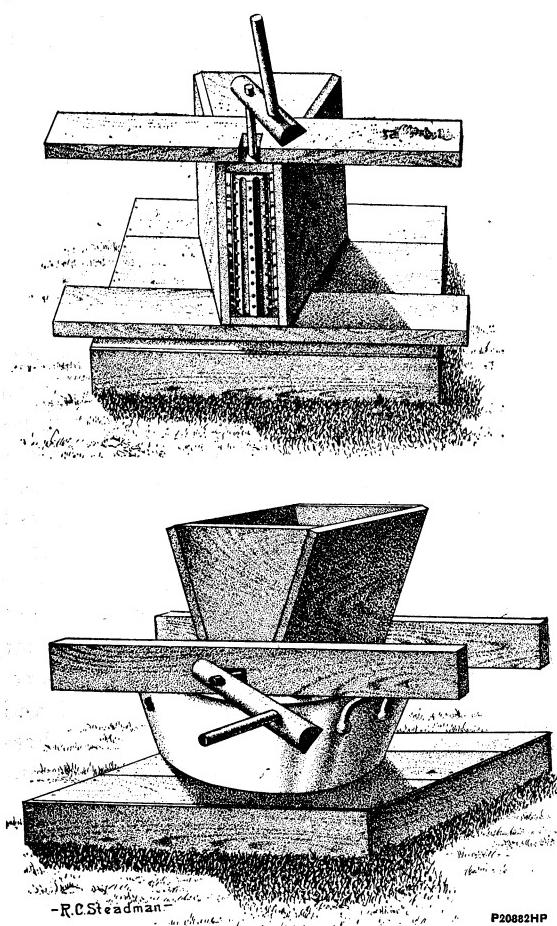


FIG. 1.—An inexpensive homemade grape crusher.

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should be used. Metal ware is subject to the corrosive action of fruit acids. A small homemade grape crusher (fig. 1) is almost indispensable. It is very efficient, though crude, and saves much time and labor. A cider press also is well adapted for crushing and pressing grapes.

Of the named varieties, the Thomas, generally speaking, makes the best grape juice and sirup of all the varieties tested and ranks near the top in tests of other products. The Scuppernong probably ranks second as a culinary variety. Its skin is more tender than that of the Thomas, and its fragrant aroma and light color combine to make its products distinctive.

Select fruit should be used. All diseased and dirty berries should be culled out.

The ordinary kitchen utensils used in preserving other foods can be employed in preserving grapes. Enamel ware, wooden utensils, and glass containers

Unfermented grape juices, jellies, canned grapes, sirups, and catsups probably are the most desirable home products, taking into consideration quality, expense, and the labor required in their preparation. Preserves, marmalades, and jams require larger quantities of sugar and are difficult to prepare, while the large percentage of sugar they contain hardens the skins somewhat, even when the best methods of preparation are used.

MUSCADINE GRAPE PRODUCTS.

SIRUP.

Since no sugar is used in making it, the sirup is one of the cheapest of the culinary products made from Muscadine grapes. It can be utilized not only as a substitute for sorghum and other sirups, but also as a sugar substitute for sweetening unfermented Muscadine grape juice and in making sirup for canning grapes. Following are brief directions for making the sirup.

Directions for sirup making.—Use well-ripened fruit of the sweetest varieties available. Secure all juice obtainable by crushing and pressing without heating. Remove any sediment that may have accumulated while the grapes were being crushed and pressed by straining the juice through a double thickness of cheesecloth. For every 6 quarts of fresh, strained Muscadine grape juice stir in 2 ounces of powdered calcium carbonate (i.e., carbonate of lime, a low-priced chemical used in sirup making to remove acids).¹ Heat the juice and allow it to boil about eight minutes. It is necessary to use a container at least one-third larger than the volume of juice, in order to prevent the vessel from overflowing when the juice foams up and breaks into a boil. Where a large vessel is not available the juice may be boiled in small quantities. Pour the hot liquid into tall glass containers, preferably large-mouthed fruit jars, so as to permit its condition to be observed. Allow the liquid to settle until perfectly clear and cool. It is well to let it stand over night. After the liquid is cool and clear, showing a distinct sediment at the bottom, pour off the clear portion into a cooking vessel, being careful not to pour off any of the sediment. To this clear liquid add one-sixth of a level teaspoonful of calcium carbonate for each six quarts of fresh grape juice which it represents.

Complete the process of sirup making by boiling down the clear liquid, using a vessel one-third larger than the volume of the liquid. If necessary, the sirup can be completed in batches. While boiling down the liquid keep the caramel which forms on the inside of the pan wiped off with a wet cloth, so that when the nearly finished product foams up it will not carry scorched caramel into the sirup. Should any scum form during the cooking process remove it with a long-handled milk skimmer. Allow the liquid to boil rapidly until nearly done and then more slowly, to avoid scorching. Cook the liquid until it reaches about one-ninth the volume of the fresh grape juice, or until a small portion cooled in a teaspoon on the surface of cold water in a cup shows about the same consistency as maple sirup or thin sorghum sirup.

¹ Farmers' Bulletin 758, Muscadine Grape Sirup, based on 1915 investigations, recommended 1 ounce of calcium carbonate to 6 quarts of juice. But investigation in 1916 showed this quantity to be insufficient under the climatic conditions of that season. It is safer to use 2 ounces.

When the sirup has reached the proper thickness, pour it into glass fruit jars, cap the jars, and place them where they will cool very slowly. Slow cooling is very important in making the sirup clear, as it allows all sediment and added substances to settle. This slow cooling can be brought about by standing the jars of sirup in a large vessel of hot water and allowing the whole to cool or, better still, by placing the jars in a fireless cooker. One of these can be made at home by placing waste cotton, such as may be procured from a cotton gin, in a worn-out bucket or box, leaving a place in the center for the jar of hot sirup.

When the sirup has cooled to room temperature it can be stored in a pantry or cellar until desired for use. A small quantity of harmless white sediment, known to chemists as malate and tartrate of lime, will be observed in the bottom of the jars. When desired for use simply pour the clear sirup into the table sirup stand, leaving the sediment, which is not easily disturbed, behind. Those who prefer, however, can pour off the clear sirup into bottles or fruit jars as soon as it has cooled and then sterilize and seal them warm, just as with fruit. Sterilization consists merely in heating the jars of sirup to the boiling point. The filled jars and the caps for sealing them are placed in a pan of water, which is then brought to a boil and held at that point until the contents of the jars are approximately of the same temperature.

UNFERMENTED GRAPE JUICE.

While unfermented Muscadine grape juices are not considered equal to the unfermented juices made from northern bunch grapes, they nevertheless are very desirable products for home use. This is especially true of the juices made from those varieties having a relatively high sugar content. The one general objection to Muscadine grape juices is that they lose their fruit flavor in storage, but this can to a degree be restored by the addition of sugar in small quantities when the juice is used. If fully ripened fruit of the varieties best adapted to grape-juice making is used, however, no sugar will be necessary. Where a home supply of Muscadine grapes is available no excuse exists for not utilizing it in making in the home a sufficient supply of unfermented juice to meet the family's needs for a year. Unfermented juice is the least expensive product that can be made from grapes, and it is a delightful, refreshing drink for summer use.

Farmers' Bulletin 644 describes general home and commercial methods used in making unfermented grape juice from the northern bunch grapes. Muscadine grape juices were successfully preserved by two methods. These are designated as the cold-press method and the hot-press method, because the only essential difference in the two processes is that in one case the juice is secured by pressing the fresh fruit without heating it, while in the other the fruit is heated and the juice expressed from the hot fruit. The cold-press method is the simplest and quickest and yields brilliant, transparent juices which are not only generally superior in flavor and aroma, but also much more pleasing in appearance. The hot-press method yields a greater

quantity of juice, but requires the additional labor of heating the fruit before pressing. Again, the hot-press juices resemble more nearly the commercial Concord grape juice, because the heating draws the coloring matter from the skins. Some of these dark juices have a very attractive color, but the flavor which the skins impart to the juice while heating rarely improves the quality of the product. Some of the hot-pressed juices, moreover, are viscid in appearance, whereas by the cold-press method the same variety of grape makes a brilliant, transparent, attractive, and more uniform product. Generally, therefore, the cold-press method is best for home use.

The following directions for making unfermented Muscadine grape juice are based upon the experiments of the United States Department of Agriculture in 1916:

Cold-press method.—Secure sound, clean, fully ripe fruit; crush the fruit by hand or, better, with a homemade crusher, such as the one shown in figure 1. If a cider mill is available, it is well adapted for both crushing and pressing. After the berries are crushed the juice should be pressed from the fruit immediately. Small quantities of fruit can be pressed in a clean cloth sack by hand, but if as much as a bushel of grapes is being handled a cider mill or an inexpensive homemade press like those illustrated in Farmers' Bulletins 644 and 758 should be used. Having secured the fresh grape juice, strain it through flannel and then place it in bottles or fruit jars. While bottles are suitable if preferred, the quart clamp-top or lightning-seal type of fruit jar is recommended as the best container for grape juice for home use. Such jars ordinarily are more conveniently and successfully used, are more generally available, and can be used also as containers for other products in succeeding years. Having placed the juice in bottles or jars, put these in a water bath and sterilize by heating until the juice has reached a temperature near but not quite up to the boiling point. If a thermometer is available, the temperature can be tested. As soon as the juice has reached a temperature of 190° to 200° F. (95° to 98° C.) remove it from the sterilizer. If no thermometer is available, remove the juice as soon as it shows the first sign of simmering preliminary to boiling. A good home water bath or sterilizer can be provided by placing a false bottom of wire gauze (4 meshes to the square inch) or a

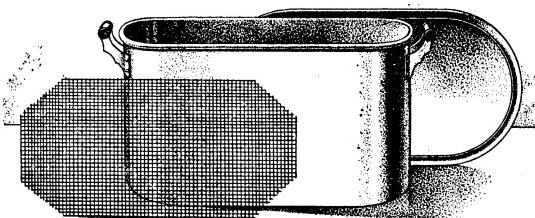
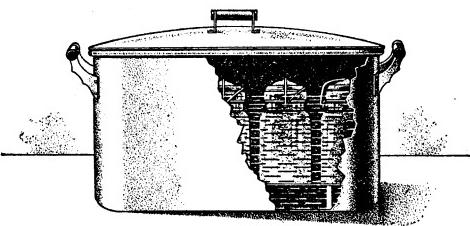


FIG. 2.—An outfit for the home sterilization of unfermented grape juice and other products.

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thin board in which numerous holes have been bored in the bottom of a wash-boiler or large, covered preserving pot filled with water enough to surround but not cover the bottles or jars of grape juice. (See fig. 2.) The false bottom enables water to get under the juice containers and the cover of the water bath confines the steam, which sterilizes the upper parts of the containers. Just as soon as the temperature of the juice has reached the point at which sterilization has been assured, remove the bottles containing the juice from the water bath, seal at once, and store in a dark, cool place until desired for use. In sealing the fruit jars, before clamping them, dip the lids and rubbers for a moment in the hot water of the water bath, so that they also will be sterilized. If bottles are used cork them with new corks that have just been soaked for about 30 minutes in water at a temperature of not less than 140° F. Use a cork a little wider than the mouth of the bottle, and after inserting this as far as possible cut off the rest of the cork even with the mouth. Dry the mouth of the bottle thoroughly and dip in a melted mixture of equal parts of beeswax and rosin or in melted paraffin.

Hot-press method.—The hot-press method is identical with the cold-press method, except that the crushed fruit is heated nearly but not quite to the boiling point and is then pressed while hot. In home work the fruit generally is heated in a large dish pan. Stir it while heating, so as to bring the entire mass simultaneously to the desired temperature. Then place it in a cheesecloth bag, hung over a receptacle to catch the juice, and press by hand. Allow the juice to cool, strain it, and then proceed as in the cold-press method.

The variety of Muscadine grapes used in making unfermented grape juice has great bearing on the quality of the final product. Undoubtedly, of all the varieties tried, the Thomas makes the best grape juice. The juice of this variety has the best flavor, the greatest brilliancy and transparency, and the most pleasing and abundant grape aroma. The Scuppernong variety ranks second for unfermented grape juice, and the Latham, Mish, Luola, George, Memory, James, and Eden rank above the average.

In the preparation of home products economy may be secondary to quality. This being the case, it is important to mention here that the first or free-run juice obtained in pressing makes the best unfermented grape juice. This is the juice between the skin and the pulp of the berry. It is sweeter, more highly flavored, and more brilliant than the juice from the seed chamber inside the pulp. In home work it is recommended that the juice secured by a very light, cold pressing be used for unfermented juice making and the residue of hulls, pulp, and pulp juice for jelly making. The unfermented juices of certain varieties that are lacking in body and sweetness can be improved in these respects by stirring into them a small quantity of Muscadine grape sirup when the juice is opened for use. The exact amount of sirup to add must be determined in each case by tasting.

Unfermented Muscadine grape juice is so very refreshing on hot summer days, so very easy to put up, and so inexpensive that every southern home should have a bountiful supply.

JELLY.

When proper methods are pursued, Muscadine grapes will yield as fine jelly as can be obtained from other fruits. Certain difficulties, however, are to be overcome.

During the autumn of 1916 and the following winter jelly-making investigations with Muscadine grapes were conducted with a view to overcoming the difficulties and determining the best means of making good jelly in the home. The two chief difficulties are (1) securing enough pectin content to give sufficient body to the finished product, and (2) avoiding the formation of argol crystals in the jelly.

MEANS OF SECURING SUFFICIENT PECTIN.

Pectin is the name given to a gelatinous substance occurring in fruits and elsewhere which enables one to make jelly. Pectin occurs in sufficient abundance in such fruits as the apple and currant to make a firm jelly and is very abundant in the white peel of citrus fruits. In some fruits it is lacking almost entirely, so that these fruits are not used for jelly making. In Muscadine grapes it is present, but in quantity generally insufficient for making firm jelly unless methods are followed which augment or concentrate the pectin.

The investigations of the Department of Agriculture show that certain factors bear upon pectin content.

(1) Probably the first consideration is to use fruit at the right stage of maturity. Full-grown green grapes seem to develop the most pectin in jelly making, and the pectin content decreases with the ripening of the fruit. Since flavor and tendency toward crystallization must be considered as well as pectin, the aim should be to use fruit as ripe as possible and yet not so ripe that the pectin will be insufficient to give to the jelly the desired body and texture. For home use riper fruit can be used than in commercial jelly making, but it is well even in home jelly making to have as much body or firmness as possible without sacrificing flavor or texture. All things considered, it probably is best to use fruit in the "rare-ripe" stage for jelly making or to use equal parts of green and ripe fruit.

(2) The pectin content varies considerably with the variety, and it behaves differently in the different varieties as they ripen. Some Muscadine grapes, even when rather green, have very little pectin, while others, such as the Scuppernong, not only have abundant pectin when green, but even when ripe have sufficient pectin to make a fair grade of home jelly. Other varieties, for example, the James, have abundant pectin content for home jelly making up to the "rare-ripe" stage, but when fully ripe have lost so much pectin that it must be supplied if jelly is to be made. The Thomas does not have so much

pectin as the Scuppernong, but as it ripens it maintains its pectin better than the James variety. The Flowers resembles the Scuppernong in pectin content, and the Mish is similar to the James, while the Eden has slightly more pectin than the Thomas.

(3) Having secured fruit at the proper stage of ripeness and chosen a variety known to contain a relatively large amount of pectin, the next means of insuring a firm jelly is to cook the fruit thoroughly before extracting the juice for jelly making. The cold-pressed juice of the Muscadine grapes contains practically no pectin, but by heating the fruit before extracting the juice pectin apparently is liberated into the juice from the solid parts of the berry. Thorough cooking insures the liberation of the full amount of pectin, but, on the other hand, if the cooking is continued too long the volume of juice will be lost through evaporation. Cooking the fruit for approximately 10 minutes after the juice first boils is about right.

(4) Having secured by cooking and juice extraction a jelly stock containing pectin, the proportion of pectin can be increased by boiling down the jelly stock to decrease its volume or by adding less than the normal quantity of sugar, so that in making the jelly a greater evaporation will take place before the jelling point is reached. It should be remembered, however, that the greater the concentration or the longer the cooking, the darker and less brilliant is the finished product. Moreover, in concentrating pectin by the evaporation of jelly stock the acid and the sugar content of the jelly stock also are concentrated. It is therefore especially necessary in this case to take precautions to avoid crystallization and, since the fruit sugar is concentrated, less commercial sugar need be added. In the experiments of the Department of Agriculture the use of a half measure of sugar to a full measure of Scuppernong jelly stock from "rare-ripe" grapes, or, better, concentrating the normal jelly stock about one-half and then using sugar, measure for measure, gave a very firm jelly.

(5) The final resort in increasing pectin is the introduction of pectin into the jelly from an outside source. The best means of doing this is by using an orange pectin solution, since this is high in pectin and almost free from acidity, color, and flavor.¹

¹ The following recipe adapted from Extension Bulletin No. 6, Florida State College for Women, Tallahassee, Fla., outlines a quick method of preparing the orange pectin solution: Cut or scrape the yellow from the peel of oranges. Pass the remaining white portion through a food chopper; then weigh it. For each quarter pound of peel add half a pint of water and 2 tablespoonfuls of lemon juice. Mix thoroughly and allow the mixture to stand one hour. Add 1½ pints of water. Let stand 1 hour; boil 10 minutes; let stand until cold. Place in a flannel jelly bag, press to remove the juice, and drain the juice through a clean flannel jelly bag.

This produces a jelly stock from which clear jelly can be made. It can be prepared in quantity and canned for future use. By double running the white peel of three dozen oranges the writer has secured on two occasions 24 pints of pectin solution. Rough-skinned, light-weight oranges have the most white peel.

Since apple-jelly stock contains abundant pectin, it is a convenient substitute for the orange pectin solution. In using it, however, a certain amount of color and flavor will be introduced, and it is less effective than the orange pectin solution in preventing crystal formation. Apple stock made from mild-flavored green or yellow ripe apples is best.

When a pectin solution is added to increase the pectin content, the amount of sugar used should be based on the quantity of grape-jelly stock, regardless of the quantity of pectin solution added, for the aim is not to make a pectin-solution jelly, but to add pectin to the grape-jelly stock. The use of pectin solutions in making Muscadine grape jelly is entirely practicable and advisable, though not necessary to make jellies of sufficient firmness for home use. Through the use of small quantities of pectin solution not only can firm jellies be made, but crystallization is avoided; and higher colors and flavors can be secured, since riper grapes may be used.

PREVENTING CRYSTAL FORMATION.

In making grape jelly and when grape juice is heated, the excess acid tends to crystallize, forming potassium acid tartrate, a substance which in wineries, unfermented grape-juice factories, and other grape-product establishments is known as argol. In large establishments this argol is saved and later refined in by-product establishments and sold as cream of tartar and tartaric acid. The formation of argol crystals in jelly should be avoided. These crystals are readily formed in Muscadine grape jellies, owing to the high acid content of this fruit, but with proper precaution may be avoided.

There are several more or less effective means of avoiding this formation of crystal in the jelly, some of which are more important than others.

(1) Grapes ripen in the autumn when the nights are cool. It is therefore possible to make the jelly stock¹ in the afternoon and allow it to stand over night in shallow pans without any fermentation. When so treated the jelly stock cools rapidly and crystals form readily against the pan and over the surface of the liquid. The jelly stock is then run through a flannel bag to remove the crystals, and the process of jelly making is continued. By this method crystal formation is greatly reduced, but not entirely prevented. The jelly stock should be allowed to stand until thoroughly cool, but it is very important not to let it stand until fermentation begins.

¹Jelly stock is the term used to designate the juice secured after cooking the fruit and placing it in a drip or drain bag. Jelly stock differs from hot-pressed unfermented juice in that it has been heated beyond the boiling point.

(2) Another method of removing crystals is to seal the hot jelly stock in glass fruit jars and then to strain and make jelly from it during the winter, at a season when there is more time for special culinary work, after the crystals have formed in the jars. This method has proved valuable, though not infallible, as a means of avoiding crystallization in the jelly.

(3) Other factors to be considered in avoiding crystallization are as follows: (1) The greener the fruit used, the greater the tendency to crystallization; (2) the higher the acid content in relation to the sugar content of the grape variety used, the greater the tendency to crystallization; and (3) the smaller the proportion of sugar added to a jelly stock, the greater the tendency to crystallization. In regard to these factors, however, a medium ground may be best, since desirable pectin content and a tendency to crystallization are, generally speaking, influenced in opposite directions.

(4) The best means of avoiding crystal formation, a means which at the same time increases the pectin content and permits the making of jelly from fresh jelly stock, is the addition of a small amount of orange pectin solution, apple jelly stock, or other fruit pectin solution. In the experiments of the Department of Agriculture the addition of 1 cup (one-half pint) of orange pectin solution and three-fourths of a quart of sugar to a quart of ripe jelly stock was sufficient to prevent crystal formation.

QUALITIES OF VARIETIES.

Muscadine varieties differ in the flavor, aroma, and color which they impart to their jellies. Of the named commercial varieties, the Thomas yields the sweetest, mildest jelly, one suited for dessert uses or with bread and butter in school lunches, while the Eden and most varieties of *Vitis munsoniana* yield tart jellies, well suited to serving with meats and game. The Thomas jellies have a fragrant aroma and a bright red color. The Eden and the Munsoniana jellies are somewhat lacking in aroma and very dark in color, but not unattractive. The Scuppernong ranks highest of all varieties from the standpoint of making a jelly which is at once good, attractive, and distinctive. Scuppernong jelly is very fragrant in aroma, a beautiful golden brown in color, and has a delicate flavor. Its flavor is intermediate between the sweet and the tart jellies, so that it is suitable for all occasions. Luola jelly has as fine color and flavor as that of any variety tried, but it is less distinctive. It has somewhat the flavor of Concord grape jelly, and is mild and sweet like Thomas jelly. The Flowers makes a jelly inferior in aroma, color, and flavor to jellies of the other varieties mentioned, and the James, Memory, and Mish rank intermediate between Flowers and the best varieties.

The possibilities in blending varieties should be alluded to. For example, a blend of "rare ripe" Luola with ripe Thomas (a possibility, owing to their time of ripening) probably would result in a better combination of color, aroma, flavor, and texture than from the use of either separately. By canning the jelly stocks of different varieties, these may be blended with each other and with other fruit-jelly stocks in any desired combination.

DIRECTIONS FOR HOME JELLY MAKING.

The investigations of the Department of Agriculture indicate that the best results in home jelly making will be secured from the following procedure:

Select fruit of a desirable variety and in the proper stage of ripeness, as explained. Use only clean, dry, sound fruit. Avoid fruit picked within 24 hours after rain, and work, if possible, during clear weather. Stem the grapes by hand and then crush a sufficient number of the berries to provide enough juice in the bottom of the cooking vessel to prevent scorching when the fruit is cooked. The rest of the berries can be crushed more easily after they are hot, using a wooden potato masher. A better plan for crushing, and one strongly recommended, is to crush all the berries before cooking by running them through a home-made crusher, such as the one illustrated in figure 1. Then cook the crushed berries in a large preserving kettle or a dish pan of a type unaffected by fruit acid, stirring with a long-handled spoon. After they have boiled about 10 minutes, or when the berries are broken down so that the mass stirs freely, pour the cooked grapes into a double cheesecloth bag, or its equivalent, and hang up to drain without pressing (fig. 3). The juice (called stock) obtained in this way can either be canned for use in winter jelly making after crystal formation or used immediately. In either case the process is the same. In making jelly at once, if the nights are cool, so that there is no

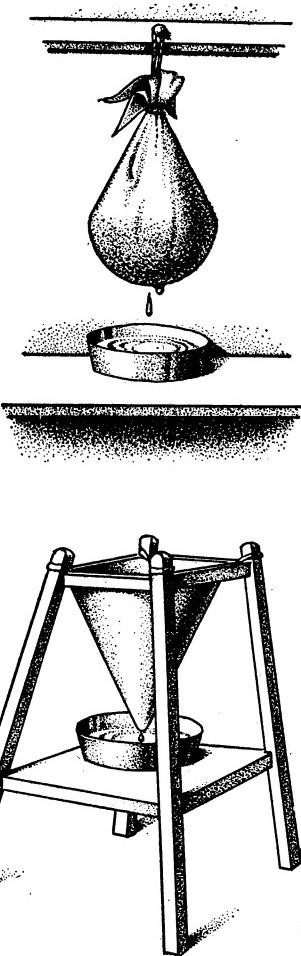


Fig. 3.—A drip or drain bag for use in jelly making (above) and a jelly bag with rack (below).

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danger of fermentation, secure the jelly stock in the late afternoon and allow to cool over night in shallow pans, in order to encourage crystal formation. After immediate cooling, after standing over night, or after canning, as the case may be, clarify the jelly stock by running it through flannel or felt at least once. For this purpose a flannel or felt jelly bag (fig. 3) is most convenient. Then test the clarified jelly stock, if possible, for sugar, acid, and pectin, in order that the character of the particular sample may be known and proper measures taken for making the best possible jelly.¹

Generally, the tests will show the jelly stock to be such that the following procedure will be approximately correct:

Measure the jelly stock and place it in a cooking vessel of such size and shape that the liquid will be shallow and spread out rather than deep and confined. For each quart of the jelly stock used add 1 cup (one-half pint) of orange pectin solution to avoid crystallization and to increase the pectin content, and then add a level quart measure of cane sugar. Stir to partially dissolve the sugar. Place on the stove and boil steadily without stirring until the liquid jells.² Remove from the fire, skim at once, and pour into sterilized jelly glasses; skim again if necessary; allow the filled glasses to stand about 12 hours, or until thoroughly set, in a cool place, preferably by an open window; paint the surface of the jelly with brandy or vinegar, and immediately cover with at least one-eighth inch of melted paraffin. When the paraffin has cooled, cap, label, and store the glasses and contents in a cool, dry, dark place.

COMMENTS AND SUGGESTIONS ON THE JELLY-MAKING PROCESS.

The following comments and suggestions will aid in the making of Muscadine grape jelly and will supplement and explain the concise directions given in the preceding section:

The acid test.—In making jelly in the home, the worker generally will have to rely on the sense of taste as a means of determining the acidity of Muscadine grape jelly stocks, for the test and equipment needed are too complicated for practical home use. If the jelly stock tastes unusually acid for the variety, being made of grapes of the Flowers or some other acid variety, or if relatively green grapes have been used to furnish the jelly stock, it is advisable to add a small quantity of apple jelly stock, or, much better, orange pectin solution. This will tend to prevent the formation of crystals of excess acid in the jelly. A cup (one-half pint) of orange pectin solution or apple jelly stock to each quart of Muscadine grape jelly stock should be sufficient to prevent crystal formation in the jelly. Unless it is necessary to increase the pectin content of the grape jelly stock, the added apple jelly stock or orange pectin solution can be considered as so much grape jelly stock in adding sugar.

The sugar test.—The proper quantity of sugar to add to the jelly stock depends on the amount of grape sugar already in the fruit and on the abundance of pectin present. The old home rule for adding sugar to jelly stock in jelly making is, "Use measure for measure." This, however, is not always right for making Muscadine grape jelly, in view of the fact that this stock is generally sweeter than other jelly stocks, such, for example, as currant and crab apple. The amount of sugar in the jelly stock can be determined rather accurately by

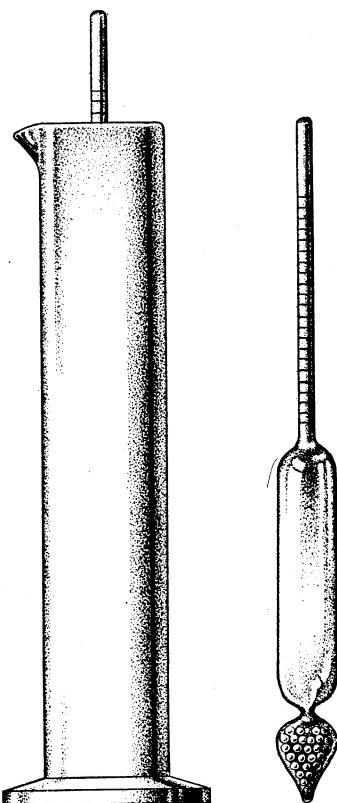
¹ For tests of jelly stock and comments, see next section.

² See description of test to determine the jelling point in the following section.

the use of a saccharimeter (fig. 4), which need not cost more than 75 cents. As the saccharimeter is a valuable instrument for use in many other culinary operations as well as jelly making, it might be considered a necessary piece of kitchen equipment. Those saccharimeters are best which when corrected to standard temperature show the actual percentage of solids in solution. Nearly all the solids in solution in grape juice and jelly stock are sugars. If the saccharimeter test gives a reading of 12 per cent or less, it is safe to use measure for measure, but if the test reads around 17 per cent, as it often does, the proportion of sugar should be reduced to three-quarters of the measure to each measure of jelly stock. If the jelly stock has been shown to be deficient in pectin content by test, the quantity of sugar may be still further decreased in order to allow for concentration. In reducing the sugar, however, it should be remembered that such reduction increases the tendency toward crystallization. It is a better plan to increase the pectin content by the addition of orange pectin solution rather than by the reduction of sugar.

The pectin test.—The pectin content of a jelly stock can be judged roughly by noting the extent to which the stock tends to flake (i. e., pour in a sheet rather than in separate streams or in one round stream) when poured from a smooth surface, such as the edge of a shallow porcelain pan. The pectin test recommended by Dr. W. N. Straughn and others¹ is easily made by placing a teaspoonful of the jelly stock in a teacup and adding to it a teaspoonful of 95 per cent grain or denatured alcohol. This causes any pectin present to gelatinize. If much pectin is present, it forms in one large mass; if little pectin is present, it forms as individual flakes in the liquid. By making this test it is possible to judge the proportion of sugar to jelly stock to use, and also whether it is necessary to introduce pectin into the stock in order to make jelly of the desired body or texture. "Rare ripe" Scuppernong grapes generally test sufficiently high in pectin to indicate that a jelly of sufficient body to hold its form when turned out of the glass can be made. This is the ideal texture for home jelly.

Jelly stock from pulp only.—Normally, Muscadine grape jelly is made by cooking the whole fruit, since much pectin can be developed from the skins. Jellies of lighter color and milder flavor, however, can be made by discarding the hulls and making the jelly stock by boiling only the pulps and juice together to develop the necessary pectin in the jelly stock.



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FIG. 4.—An outfit for testing the saccharine content of fruit juices.

¹ Harris, Agnes E. Jellies, preserves, and marmalades. Receipts and directions. Fla. State Coll. Women Extens. Bul. 6, 28 p., illus. 1916.

Time to add sugar.—In making jelly from Muscadine grapes in the home it is recommended that the sugar be added to the jelly stock before beginning the process of boiling down to the jelly point. If, however, the aim is to make the most brilliant and attractive jelly possible, it is advisable to withhold the adding of sugar until the jelly stock has boiled down or evaporated to approximately half its volume. In this case, the sugar should be heated in the oven while the jelly stock is boiling down and added hot, so as not to cool the boiling liquid. This late addition of sugar reduces the time during which the jelly cooks at a high temperature, since the more sugar a liquid contains the higher the temperature required to make it boil, and boiling may proceed at a relatively low temperature up to the time of adding the sugar.

Skimming.—Normally, in making jelly in the home it is well to remove any scum forming on the surface of the boiling jelly as soon as it forms in a definite mass, but skimming is not absolutely necessary until the finished jelly has been poured into the glasses. If a heavy scum forms, it is best to remove it before the jelly foams up in boiling; again, when the boiling is completed but before pouring into the jelly glasses; and then a third time after it is in the glasses. Normally, however, it will be found entirely satisfactory to omit either the first or the second skimming mentioned.

The jelly test.—In making jelly for home use the aim should be to end the boiling-down process as soon as enough water has been evaporated to give a jelly of sufficient body to hold its form when it is turned out of the glass, but to avoid cooking it until it is tough and gummy.

The exact stage at which the jelly should be poured is called the jelling point. This depends greatly upon the amount of pectin in the particular lot of jelly. The more pectin present the sooner the jelly can be safely removed from the fire and the higher the quality of the jelly. Normally, it should be removed from the heat very shortly after it has attained a temperature of 218° F. If one is making several runs of jelly from the same lot of jelly stock the proper temperature for removing the jelly from the fire can be determined and uniform results secured by cooking all lots to this temperature. If, however, different jelly stocks are being used, the exact temperature of the jelling point will vary more or less, owing to the variable pectin content. For this reason in making jelly in the home the thermometer serves only as a guide, and the ordinary flake or sheet test should be relied upon chiefly. This test is made by taking a little of the boiling liquid on a stirring paddle or spoon, rotating it a moment to partially cool it, and then pouring it back into the cooking vessel, noting the way in which it leaves the paddle or spoon. If it flakes or sheets—that is, pours in a sheet rather than as a thin sirup, it is safe to remove the jelly from the heat. If in pouring over the edge of a spoon the jelly flakes or sheets, a little jelly often adheres to the spoon, hanging as a jellylike string or rope of one-half to 1½ inches in length. After making one or two runs of jelly, the worker will have little difficulty in determining the jelling point fairly accurately by the flaking or sheeting test. The time required to boil down the jelly stock and sugar mixture to a jelly varies greatly with the volume of jelly being made, the shape of the cooking container, and the intensity of heat applied.

Weeping.—The Muscadine jellies, like other jellies, tend to "weep;" that is, they tend to absorb moisture and by capillary action climb up the side of the container and overflow in tearlike streams. No means of avoiding this is known at present; but, normally, weeping will be avoided if the worker does not fill the glasses to the brim, is careful not to tilt or jar the jelly in the glasses, and stores the product in a dry place.

CANNED GRAPES.

Canning is a very economical way of utilizing Muscadine grapes, since little sugar is required for this process. The canned grapes are suitable for serving on the home table in sauce dishes as a breakfast appetizer, a side dish, or a dessert. They can be used also in pies, puddings, cakes, etc.

In the investigations of the Department of Agriculture the Muscadine grapes were canned successfully by three methods, designated as the cooking method, the sugar-sirup method, and the grape-sirup method. The first is the easiest and most practicable, while the two others have the advantage of yielding more attractive products, because the berries do not lose their shape. Whatever the method, the essential features are (1) getting rid of the seeds, (2) softening the skins, (3) sweetening with a small addition of sugar, and (4) careful sterilization and sealing in fruit jars.

Cooking method.—In canning grapes by the cooking method, which is the one generally recommended for home use, use firm but fully ripe fruit. After weighing the berries, separate the skins and pulps after running the fruit through a crusher like that shown in figure 1. If preferred, the berries may be pulped by hand. Then place the hulls in a closed vessel, adding one-half pint of water for each 6 pounds of fresh fruit. Cook until the hulls are quite tender. When this point is reached, the added water will have mostly evaporated unless the vessel has been very tightly closed. While softening the hulls, heat the pulps and juice in another vessel until the pulps break down enough to liberate the seeds. Then put the pulp through a colander to get rid of the seeds. Put the seedless pulps and softened hulls together when cool and add sugar and water at the rate of 1 pound of sugar and one-quarter pint of water to each 6 pounds of fresh fruit. Then bring the mixture slowly to a boil, and after boiling for 8 to 10 minutes pack and seal it while hot in hot sterilized fruit jars.

Sugar-sirup method.—In canning the whole berries by the sugar-sirup method use firm, ripe fruit. Slit all the berries on the side horizontally with a small-bladed knife, and then brush the seeds from them with the point of the knife. Pack the seeded whole berries, cold, in pint jars and pour over the fruit until the jars are filled a sugar sirup made by boiling equal measures of sugar and water together for 1 minute. After allowing to stand for half an hour to permit the sirup to seep through the slit in the berries, refill the jars with sirup, and put the rubbers and caps in place with the jar clamp in a raised position. Then steam the jars in a home steamer until the skins have softened and the fruit and jars are sterilized. While the jars are still hot refill with boiling sugar sirup and then seal by clamping down the lid. The proper length of time to steam the fruit and jars varies with the variety. The Scuppernong requires approximately an hour; the James should steam an hour and a half; and the Thomas will require fully two hours. The aim should be to steam the fruit long enough to soften the skins without having the berries break down. Unless the seed are removed so that the sugar sirup gets inside as well as outside, the berries shrivel up when canned by this process.

Grape-sirup method.—The grape-sirup method is identical with the sugar-sirup method, except that a concentrated grape juice, made by boiling the unfer-

mented fresh juice down to two-thirds its original volume, is used. The quality of the finished product obtained by this method is hardly equal to the product canned in sugar syrup, but the method avoids the necessity of using sugar and therefore is economical.

For canning purposes the Thomas and the Scuppernong varieties are best.

SPICED GRAPES.

Spiced Muscadine grapes are much the same as canned grapes prepared by the cooking method, except for the spices. The product is slightly more expensive and more difficult to make, but a small amount of it will be desirable for the sake of variety, and many people greatly prefer the spicy products to those having pure fruit flavors.

The method used for making spiced grapes is essentially like the cooking method of canning the grapes.

After combining the softened hulls and seeded pulps, for every 5 pounds of fresh fruit used add the following:

2½ pounds of sugar.	1½ ounces of ground cloves.
2 ounces of ground cinnamon.	½ pint of vinegar.

Then boil the mixture over a slow fire until a little thick. If 5 pounds of fruit are used this will require about an hour's boiling.

Since the flavor of the spices predominates, the variety factor is of less importance than in other products. Some people prefer a special product made as above, but with the vinegar, the cloves, and half the sugar omitted.

CATSUP.

Muscadine grape catsup is a pleasing sauce to serve with cold meats. It is a cheap, easily made product, and keeps well even in an open container. Moreover, it holds an important place in Muscadine grape utilization, because it can be made from varieties which, owing to their acidity, are not well adapted for use in other ways. In making catsup the juicy varieties are best, and an acid juicy variety is to be preferred to a very sweet one.

To make Muscadine grape catsup, first weigh and then crush the fruit. Stew the crushed fruit over a slow fire until soft, and then work it through a colander with a spoon, leaving the skins and seeds behind. To the juicy portion which passes through the colander, add for each 5 pounds of fresh fruit used—

2½ pounds of sugar.	½ tablespoonful of pepper.
1 tablespoonful of ground cinnamon.	½ tablespoonful of salt.
1 tablespoonful of ground allspice.	1 pint of vingear.
1 tablespoonful of ground cloves.	

Boil the mixture until slightly thick and then seal it hot in hot sterilized bottles or fruit jars.

CONSERVES.

Muscadine grape conserves are delicious products, well adapted for use in making sandwiches for school lunches. They also make a good dessert and may be used as a substitute for preserves, jam, etc. They are slightly more expensive than some of the products already discussed, but if orange pectin solution has been prepared in connection with jelly making, the making of these conserves will utilize the oranges from which the peel was taken for the pectin solution. The fact that they contain raisins, oranges, and nuts in addition to grapes makes them a very wholesome combination. One recipe for making conserves is as follows:

3 pounds of grapes.	2 large oranges.
1 pound of sugar.	$\frac{1}{2}$ pound of finely ground pecans.
$\frac{1}{2}$ pound of finely ground raisins.	

Take sound, ripe oranges. Weigh and pulp them. Treat the pulps as in canning, in order to remove the seeds. Grind the hulls fine in a meat grinder or chop them as fine as possible, and then soften them as in canning. Place the hulls and pulps together and add for every 3 pounds of fresh fruit 1 scant pound of sugar, half a pound of finely ground raisins, the meaty part of two large California oranges, and one-fifth of the ground peel of one orange. Cook this mixture approximately an hour over an even, slow fire until it is real thick. Then stir into the mixture one-half pound of ground pecan-nut meats. After again allowing it to boil for about five minutes remove it from the fire, pack solidly in small containers, such as 4-ounce jars or jelly glasses, and cover with paraffin. If the product is packed in jars, these can be processed for 15 minutes, in order to sterilize the contents.

Since the conserves are a mixture of several products, the particular variety of grape used is of less importance than in some other products. However, those varieties having relatively thick skins which soften readily are the best for this purpose. Delicious conserves have been made from the Scuppernong, Thomas, and James varieties.

PRESERVES.

Muscadine grapes can be used for making preserves, but they are not as valuable in this form as in products requiring less sugar. The large quantity of sugar used in preserving causes the skins of the grapes to harden more or less, even though they have been thoroughly softened during the process of preparing the preserves.

The method which was found best for preserving the grapes is as follows:

Take "rare ripe" fruit. Weigh it and slit the berries on the side or cut in two with a sharp knife and extract the seeds with the point of the knife. To every 2 pounds of grapes add a half pint of water and cook the fruit in a closed preserving kettle until the skins are tender. When this point is reached add $1\frac{1}{2}$ pounds of sugar for every 2 pounds of fresh grapes after it has been brought to approximately the same temperature as the fruit by heating in the oven. Then

allow the mixture to boil slowly for approximately five minutes, after which lift the berries from the sirup with a long-handled, perforated milk skimmer, and place in shallow dishes. Boil the sirup about five minutes longer in order to thicken it to near but not quite the point of concentration at which it should jell. Then remove it from the fire and pour over the berries. Allow the berries and sirup to stand over night. The next morning pack the mixture, while cold, into fruit jars. Process these by heating in a home steamer for a sufficient time to sterilize the jars and their contents thoroughly, after which clamp the jars tight and label them. Pint jars require processing for about 20 minutes and quart jars require about 30 minutes.

Generally speaking, the varieties which are suitable for canning purposes are the ones best adapted to preserving.

JAM.

Muscadine grape jam is a very good product if properly made, but there is danger of too much or too rapid cooking, of the use of too much sugar, and of not getting the skins properly softened in so sweet a product.

Up to the point of adding sugar, jam is prepared in the same manner as canned grapes. Then to the combined hulls, pulp, and juice—the skins having been softened and the seeds removed from the pulp—1 pound of sugar is added for each 2 pounds of fresh fruit. The mixture is cooked very slowly, with frequent stirring, until thick, then packed and sealed hot in sterilized, hot fruit jars.

If sweet varieties of grapes are used, less sugar is needed, while if the varieties are acid, the proportion of sugar had better be increased. The Flowers grape, a very coarse variety, made a good jam by using 3 pounds of sugar to 5 pounds of fruit. Although not so well adapted for use in other ways, this is one of the best varieties for jam making, because its skin is meaty and readily softened. The relative softening qualities of grape skins may be determined by biting the skin and noting the ease with which it parts under the pressure of the teeth. Such varieties as the Thomas and James offer more resistance to the teeth than varieties like the Flowers and Scuppernong.

MARMALADE.

Of the heavily sugared Muscadine grape products, the marmalade or butter is most desirable.

To make this product, pulp the ripe grapes, discarding the skins. Heat the pulps with the juice and put them through a colander to remove the seeds. Add to the pulp and juice half a pound of sugar for every pound of fresh fruit used. Cook the mixture slowly on a steady fire for approximately an hour, or until thick and of jellylike consistency. Stir repeatedly while it is cooking. If desired, ground pecan-nut meats, strips of citrus fruits, or a few softened grape hulls may be added to the mixture about five minutes before removing from the stove. Pack and seal the marmalade hot in sterilized jars.

MINCEMEAT.

Muscadine grape mincemeat is another appetizing and distinctive product, somewhat like conserves, but cheaper, and containing fewer ingredients. No oranges are required in making mincemeat. This is an important consideration, since oranges are expensive and often very scarce in parts of the Muscadine grape territory at the time the grapes are ripening. The grape mincemeat, as its name implies, is a substitute for ordinary mincemeat. In making pies equal parts of the mincemeat and chopped apples are usually used, but the mincemeat is a delicious product without the addition of apples.

To make the mincemeat,¹ pulp the grapes, placing the pulp in one porcelain vessel and the hulls in another. Cover the hulls with water, boil violently until tender, and then run through a meat grinder, using the coarsest plate. To the pulp and juice add a teacup of water (one-half pint) for every quart of pulp and juice; boil until tender (about 15 minutes), and press through a colander to eliminate the seeds. Then mix the pulp, juice, and hulls, and to every quart of the mixture add—

The pulp of one lemon.	Two cups (1 pint) of sugar.
The ground white rind of one lemon.	One grated nutmeg.

Boil until of a thick, smooth consistency—that is, until it flakes or sheets when poured from a spoon. Seal while hot in sterilized jars.

In using this for mincemeat pies add one part of chopped apples for each part of grape mincemeat, or, where fall apples are available, these can be added when making the mincemeat.

FLAVORING SIRUP.

This sirup, as its name implies, is intended for use as a flavoring ingredient in the making of punch, sherbets, ices, etc. It is quite different from the heavy concentrated product previously described.

To make the flavoring sirup¹ add 1 quart of water to each gallon of crushed grapes and boil violently until thoroughly cooked—that is, until easily stirred and of even consistency—the berries being broken down. Then pour this liquid into a thick flannel jelly bag and let it drip into a porcelain vessel until all available juice is secured. Measure the juice and return it to the preserving kettle, adding a measure of sugar for each measure of juice. Stir until the sugar is dissolved. Let it reach the boiling point, but it must not boil or bubble. As soon as the boiling point is reached pour the sirup into sterilized bottles or jars and seal them while hot.

Two to three tablespoonfuls of this flavoring sirup added to a glass of water or to crushed ice is very refreshing.

For punch, use 1 pint of the flavoring sirup to each gallon of material.

¹ This recipe was furnished by Mrs. Dora Dee Walker, assistant State home demonstration agent, Appleton, S. C.

SUMMARY.

Desirable culinary products can be easily and cheaply prepared in the home from surplus home-grown Muscadine grapes.

Such products may be used as a substitute for or to supplement products requiring a cash outlay.

Only simple home utensils are needed in the preparation of these products.

The utilization of fruit heretofore unused will not only prevent waste in the home, but indirectly aid the commercial industry.

The Thomas and the Scuppernong are the best of the standard commercial varieties for culinary purposes.

Jellies, grape juices, sirups, canned grapes, catsups, and conserves are the more desirable products made from Muscadine grapes.

Of the products made from the whole fruit, those requiring a large proportion of sugar are not equal in quality to those in which small proportions of sugar are used.

Muscadine grape sirup is made without the addition of sugar. It is not only a good sirup, but useful as a sugar substitute in preparing other culinary products.

Muscadine grape juice is the cheapest product and the most easily made of all those mentioned in this bulletin. This juice is a pleasant and refreshing summer drink. The Thomas is the best variety for making grape juice, and the Scuppernong ranks second of all the varieties tried. The cold-press method described is the best and cheapest for preparing this grape juice.

Muscadine grape jelly ranks high as a culinary product. In making it the two essentials are to avoid crystal formation in the jelly and to provide enough pectin to make jelly with sufficient body. The chief factors to be considered are the ripeness of the fruit, the variety, the quantity of sugar used, the general procedure, and the proper use of pectin solution.

Canned Muscadine grapes and spiced Muscadine grapes are desirable products and are relatively cheap. The chief essentials in canning are the removal of seeds, the softening of skins, and the thorough sterilization of fruit and containers.

Muscadine grape catsup is an excellent sauce for serving with cold meats. It is an easily prepared product and relatively cheap.

Muscadine grape conserves are very delicious and wholesome, consisting of raisins, oranges, and nuts combined with grapes. They are especially recommended for school lunches in the South.

NOTE.—This bulletin is concerned with products prepared primarily for home consumption. If any of them are to be offered for sale, it should be remembered that all such products sold within a State are subject to State laws and regulations regarding quality, labels, etc., and that those sold within the District of Columbia or intended for interstate shipment must also conform to the requirements of the Federal Food and Drugs Act of June 30, 1916, as amended. These requirements should therefore be thoroughly understood before the preparation of any of the products for sale is undertaken.

